THE AUSTRALASIAN DIPTERA OF J. R. MALLOCH.*

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(With One Portrait, Plate xi.)

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An index to the Diptera from the Australasian Region dealt with by J. R. Malloch, comprising lists of families, groups, genera and species with bibliographical references and present location of the type and other named material and a bibliography of those papers by J. R. Malloch which concern the Australasian Region.

1. Introduction and Acknowledgements.

The present task was conceived by one of us (D.J.L.) because of the need for stabilization of the important type collections housed in the School of Public Health and Tropical Medicine. It was inevitable that the exigencies of the past war should have occasioned some degree of neglect in these collections, and with changes of staff in a small department it became necessary to establish the *status quo* of the collections under its care.

This could have been done as a purely domestic matter, but, because of the outstanding significance and the great extent of the contribution made by J. R. Malloch to our knowledge of the Diptera of Australia and the Pacific, it was decided to extend this project to the point of providing a basic document of reference to the work of J. R. Malloch on Australasian Diptera.

For the attainment of our objectives Miss M. Crust was appointed to devote her attention to producing a bibliography of pertinent literature and lists of species and higher groupings, dealt with by J. R. Malloch. This formed the basis of the present work and she was then able to give her attention to the rearrangement and listing of all the material in the collection of this School described or otherwise dealt with by Malloch. This was no mean task and constituted an arduous part of the total labour involved and was almost exclusively accomplished by Miss Crust.

It was at this stage that the co-operation of other organizations was sought. We felt that having set our own house in order we could legitimately impose on the time of entomologists in institutions elsewhere in Australia and overseas to find the extent to which Malloch type material was represented in these places. In all cases co-operation was most readily forthcoming and due acknowledgement is made below. In this way a body of information was gradually built up on the disposition of Malloch type material, leaving towards the end a residue of 200 species, the whereabouts of whose types became problematical. At this stage the literature had to be checked again and approaches made to a number of other institutions which were reputed to hold small numbers of the types in question, until gradually the number of missing types was reduced to little more than 50.

These latter stages have involved the entry, in the previously prepared master list, of all information coming in from outside sources. The reliability of the master list has been cross-checked by the submission of this outside information, and since less

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than a dozen species have been added to the list, this leads us to hope that it has attained a reasonably high order of accuracy.

It is often true that the complexities of a problem remain undisclosed until it is partially solved. In the present case we were aware of difficulties in working with Malloch material, but we had no conception of the very considerable difficulties inherent in the acquisition of Malloch's private collection by the United States National Museum. Indeed, our lists would never have approached completion, except for our own domestic problem, were we not able to have indirect access to this important collection. This indirect access has been provided by Curtis W. Sabrosky, of the staff of the United States Department of Agriculture, Agricultural Research Service, who has been in every sense a collaborator in the present task. His contribution to the final completion of these lists has been a very considerable one which has been all the more valuable because of his wide knowledge and critical approach to the many little problems involved. We are indeed most deeply indebted to the ever-willing assistance of Mr. Sabrosky. Other members of the same service who have also assisted in their particular fields are Dr. Alan Stone and Dr. Willis W. Wirth.

Outside Australia the next most important collection has been that of the British Museum (Natural History) and we are indebted to Mr. H. Oldroyd for listing and checking the fairly considerable holding of Malloch type material there. Dr. E. H. Bryan, Jr., of the Bernice P. Bishop Museum, provided us with all details of relevant material lodged there in a form which considerably lightened our own work.

Elsewhere outside Australia, Dr. F. Peus, of the Zoologisches Museum, Berlin, and Dr. H. Sachtleben, of the Deutsches Entomologisches Institut, have promptly supplied us with required information. We are also indebted to the Directors of the Musée Royale d'Histoire Naturelle de Belgique, the Rijksmuseum van Natuurlijke Historie, Leiden, the Hungarian Museum of Natural History, the Vienna Natural History Museum and the Zoological Museum, Hamburg, for information concerning the small holdings of Malloch material in these places.

Of most importance in Australia, apart from this School, have been the collections of the Division of Entomology, C.S.I.R.O., and of the Australian Museum. Dr. S. J. Paramonov and Mr. T. G. Campbell, of the former institution, have been most co-operative at all times, and for the latter Mr. A. Musgrave has been most helpful.

Mr. H. Womersley, of the South Australian Museum, and Mr. C. E. Chadwick and Mr. E. H. Zeck, of the New South Wales Department of Agriculture, have provided us with information concerning their respective institutions.

In New Zealand we are indebted to both Dr. D. Miller and Mr. A. W. Parrott, of the Cawthron Institute, for information concerning types held in both the Cawthron and the Canterbury Museum.

For details concerning Malloch's career we are indebted to Dr. W. V. King, Dr. W. L. McAtee and officers of the United States Fish and Wildlife Service. To Malloch himself we are grateful for the portrait reproduced herein.

Finally the unenviable job of typing this entire document twice fell to the lot of Miss C. Mullen, of this School, and we are most grateful for the care and patience she devoted to it.

It is appropriate, since Malloch published so many of his papers (45 papers totalling over 850 pages) in the PROCEEDINGS OF THE LINNEAN SOCIETY OF NEW SOUTH WALES, that this catalogue should be presented in this journal.

(D.J.L.)

2. J. R. MALLOCH.

John Russell Malloch is now living in retirement in Florida, having pursued a very active career in systematic entomology over a long period of years.

His birthplace was Milton of Campsie, Stirlingshire, Scotland, and the date, 16th November, 1875.

His early interest in entomology is evidenced by a number of papers appearing in journals such as the *Scottish Naturalist* following his graduation as Bachelor of Arts of the University of Glasgow in 1897.

In 1909 Malloch went to the U.S.A. and for a few years he travelled and worked in various jobs, including pattern designing in a silk works in New Jersey.

In 1912-13 he obtained a position as scientific assistant in the U.S. Bureau of Entomology; later he worked on insects at the Philadelphia Academy of Natural Science until he joined the State Natural History Survey of Illinois, where he remained until 1921.

His work with the U.S. Biological Survey (now Fish and Wildlife Service, Department of the Interior) commenced in June, 1921, when he was appointed Technical Assistant. Two months later he became Assistant Biologist, and in 1924 Associate Biologist, and was later promoted to Biologist in 1929, a position he held until the end of 1934, when he retired. He rejoined this department for a little over two and a half years in 1936-1938, when his official activities ceased, although his research activities continued for at least the next four years.

Malloch's early interests in entomology appear to have been in lepidopterous life histories, although his first descriptions of new species were of Hymenoptera. He also published on Hemiptera, but his long-continued interest has been in the Diptera, a group in which his studies embraced many families.

His work in the State Natural History Survey of Illinois culminated in the appearance of his important general work, "A Preliminary Classification of Diptera, Exclusive of Pupipara, based upon Larval and Pupal Characters, with Keys to Imagines in Certain Families", appearing in the *Bulletin of the Illinois State Laboratory of Natural History*, Vol. XII, article III, 1917, pp. 161-407.

From this period on his work has beeu exclusively on Diptera, but was far from confined to the fauna of the American continent. Important contributions were made to our knowledge of certain families on a global basis, but regionally his work extended to South America, the Pacific, Australasia, Malaya and Africa.

He has been, unquestionably, one of the most prolific Dipterists and it would now be difficult to assess the total number of species of which he is the author.

In the Australasian region we know that he described well over 1000 new species and reviewed more than twice as many more. This has been done in approximately 140 papers covering a range of 37 families of Diptera varying from the Bibionidae to the Tachinidae. In this region he has made important contributions to our knowledge of the Muscidae, Calliphoridae and Tachinidae, but even more important are his studies on the various families of Acalyptrate Muscoidea.

Most of Malloch's contributions to Australasian entomology came within the period 1920-1940, and in many of the groups he dealt with he was the sole worker.

His work is frequently basic and in many groups remains the latest authoritative work in Australian literature. Indeed, it is only in very recent years that there has been any attempt, by younger workers, to follow on with more modern revisions of a few of the many groups dealt with by Malloch.

There is no doubt that revisions are needed, but the basic framework of classification and species has been provided for us, under the difficult conditions imposed by small collections being sent abroad for study. Our task is now to convert this structural framework into a fuller knowledge.

Had Malloch not co-operated so fully in studying our local Diptera we would probably still be facing the construction of this framework, and we are greatly indebted to him for the task he has performed on our behalf.

3. Key to Abbrevations and Notes on Interpretation.

(*a*) *Abbreviations.*

Type material of Diptera from the Australasian Region has been located in seventeen collections. These are referred to in the list of species under the following abbreviations:

SPHTM.—School of Public Health and Tropical Medicine, University of Sydney, Sydney, New South Wales, Australia.

Aust. M.—The Australian Museum, College Street, Sydney, New South Wales, Australia.

NSW Dept. Agr.—The New South Wales Department of Agriculture, Farrer Place, Sydney, New South Wales, Australia.

CSIRO.—Division of Entomology, Commonwealth Scientific and Industrial Research Organization, Australian Capital Territory, Australia.

S.A. Mus.—The South Australian Museum, Adelaide, South Australia, Australia.

Cawthron.—The Cawthron Institute, Nelson, New Zealand.

C'bury M.—The Canterbury Museum, Christchurch, New Zealand.

Bishop M.—The Bernice P. Bishop Museum, Honolulu, Hawaii.

USNM.—The United States National Museum, Washington, D.C., United States of America.

BM(NH).—The British Museum (Natural History), Cromwell Road, London, England.

Bruxelles.—Musée Royale d'Histoire Naturelle de Belgique, Rue Vautier 31, Bruxelles, Belgium.

Leiden.—Rijksmuseum van Natuurlijke Historie, Leiden, Holland.

Amsterdam.—Zoologisch Museum, Zeeburgerdijk 21, Amsterdam, Holland.

Budapest.—Orszagos Termeszettudomanyi Muzeum, Baross Utca 13, Budapest VIII, Hungaria.

DEI.—Deutsches Entomologisches Institut, Berlin—Friedrichshagen, Waldostrasse I, Germany.

Hamburg.—Zoologisches Staatinstitut und Zoologisches Museum, Hamburg 13, Bornplatz 5, Germany.

Vienna.—Naturhistoriches Museum in Wien, Wien, 1, Burgring 7, Austria.

Throughout the various lists literature references have been cited with a key number (M1–M135) followed by page references in brackets. The key numbers refer to the individual papers, serially listed, in the bibliography. In a few cases a serial number, e.g. M110 (*a*), covers more than one individual paper which appeared consecutively in the one publication. An attempt has been made to keep the papers in strict chronological order, but this has occasionally broken down within a particular year when publication in more than one journal has been involved. This means that in a few cases the reference with the lowest key number may not be the first reference to the species in question.

(*b*) *Notes on Interpretation.*

(i) *Scope of the Species List.*

We have endeavoured to list every species dealt with by Malloch from the Australasian Region which, for the convenience of this publication we interpret as Australia, Timor, islands northward to the Moluccas, and all islands of the Pacific eastward and southward from New Guinea to Hawaii. An occasional species from just outside this area has been included, but all strictly Oriental species have been excluded.

This species list is built up from the papers listed in the bibliography and from the material handled by Malloch. Occasionally no reference is given for a species although material identified by Malloch is listed. This simply means that the species in question has been identified by Malloch but not dealt with in the literature. All references by Malloch to Australasian species that we have discovered have been entered with the one important exception of his Catalogue of Australian Tachinidae (M47). This being in itself a full catalogue, we considered it would be redundant to republish the information which is already in its most useful form. The occasional references to this Catalogue have occurred because Malloch has identified certain of the species listed without discussing them in any subsequent paper.

(ii) *Holotypes.*

Malloch infrequently used the term "holotype", the majority of his citations and labels being simply "type". As his intentions are clear we have consistently used "holotype" in the lists for the more ready differentiation of other kinds of types.

Although the majority of relevant types have been located there does remain a residue for which information is lacking. It is difficult to be positive that a missing